

M E M O R A N D U M

TO: SIP Inventory Preparers and EPA Regions

FROM: Inventory Guidance and Evaluation Section
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SUBJECT: Emissions from Solid Waste Combustion and Open Burning

This technical memorandum was prepared by Radian Corporation under contract to the Office of Air Quality Planning and Standards, US Environmental Protection Agency (EPA Contract No. 68-D0-0125). The objective of this work assignment is to provide technical support to State and local agencies preparing 1990 base year State Implementation Plans (SIP) emission inventories. The interim procedures outlined in this memorandum may not conform to future releases of EPA procedures and guidance. However, they are based on the best data available at this time.

Several states have requested additional guidance for calculating emissions from solid waste combustion. This memorandum describes the various categories of solid waste combustion, offering perspective to States in developing their own methods to estimate emissions.

Confined Burning of Municipal Solid Waste

Municipal waste combustors (MWCs), also referred to as incinerators, include any type of equipment that combusts municipal solid waste (MSW) generated by residential, commercial/institutional, and industrial sources. Currently, federal regulations cover MWCs in two subparts of the Clean Air Act. Facilities constructed before 1972 that have individual combustors over 50 tpd capacity are covered by Subpart E. Facilities with facility capacity over 250 tpd are covered by Subpart Ea. Smaller units will most likely be covered later this year. The "September 6, 1991 Meeting Summary: Appendix 1" (Docket No. A-90-45, Item No. II-E-12) indicated that the lower size cutoff for the future New Source Performance Standards (NSPS) regulation covering MWC facilities under 250 tpd capacity might be in the 20 to 50 tpd capacity range. However, smaller MWC facilities are currently subject only to State regulations. Most States require that all MWCs be permitted, including the smaller facilities [with capacities less than 5 tons per day (tpd)]. If this is so, data on the number and capacity of MWCs should be readily available. However, States should verify whether or not there is a size cut-off for permitting MWCs. If there is a small

size cut-off, then the group of unpermitted facilities should be treated as area sources, and the State would be required to estimate the total capacity of this smaller MWC population. In the past, on-site MWCs have been installed on residential, commercial/ institutional, and industrial property to incinerate MSW on-site to avoid the need for collection. As a result, these on-site MWCs have tended to be much smaller than MWCs that burn MSW collected from entire communities. The population of these smaller on-site MWCs has been declining over the last 20 years. In many cases, States may not have a record of these small MWCs because they are below the State's small-size cutoff and are not permitted or because they are so old. It is up to the State to determine whether these sources are required to be permitted and whether they exist. The on-site MWCs that are permitted should be treated as point sources, and those that are not required to be permitted should be treated as area sources. For the area source population of on-site MWCs, States must estimate the total capacity, based on local solid waste disposal practices.

In considering their on-site MWC population, a State must consider the MSW disposal practices of the following types of public and private establishments: apartments/buildings, prisons, schools, hospitals, research facilities, and other commercial and industrial establishments. Unless States have reason to believe that residential MWCs are used, States should exclude this type of MWC from their inventory. It is unlikely that many residential incinerators are still in use. Hospital incinerators are currently treated equally to MWCs and covered under the MWC regulations indicated in this memo. However, NSPS regulations specific to hospital ("medical waste") incinerators are expected to be proposed within a year. To make estimates of their on-site MWC population, States should not refer to the estimates provided in Table 4.6-1 of the procedures document. These data are 25 years old and do not reflect more recent trends in solid waste disposal. Furthermore, States will not be able to obtain procedures or information from EPA contacts in the Regional offices because there is no updated information. States must do their best to make these estimates by one of the two following approaches: 1) States may individually locate MWCs and gather site-specific information on capacity and combustor type, or 2) States may determine the number of MWCs and identify the "average" MWC in terms of capacity and combustor type. States may wish to take the first approach and gather more accurate information for their MWC emissions inventory because the future federal NSPS regulations will require States to identify

individual facilities down to a specified lower size cutoff anyway. If States choose the first approach, they may use the specific information on capacity and combustor type along with the emission factors in Tables 2.1-1 and 2.1-3 of the AP-42 document to calculate total emissions from area source MWCs. If States choose the second method, they may use the information on the "average" MWC and Tables 2.1-1 and 2.1-3 of the AP-42 document to calculate emissions from the "average" facility and multiply it by the estimate of the number of facilities to get total emissions from area source MWCs.

Open Burning of Municipal Solid Waste

Currently, open burning is allowed only for non-collected waste. Open burning at municipal landfills was prohibited in 1979 as stated in 40 CFR 257. However, no federal law prohibits or restricts on-site open burning of MSW. Laws concerning open burning of MSW on residential, commercial/institutional, and industrial property are determined by State and/or local law. In general, open burning in urban areas is either prohibited or very restricted and required to be permitted. However, open burning of MSW in rural areas may not require a permit. Depending on a State's open burning laws, obtaining estimates on how much open burning occurs will vary in difficulty. States should not refer to Table 4.6-2 in the Procedures Document for estimates because the data provided is outdated. Furthermore, States will not be able to obtain procedures or information from EPA contacts in the Regional offices because there is no updated information. As with unpermitted confined incineration facilities, States must determine by whatever means available the open-burning practices in their respective areas. If a State is unable to develop an estimate of the amount of MSW burned locally, the national estimates of per capita generation of the various types of MSW in Table 1 may be useful. These per capita generation estimates were developed by the Office of Solid Waste using a "material flows methodology", based on production data (by weight) for the materials and products in the waste stream. The estimates were adopted from Table 29 of "Characterization of Municipal Waste in the United States: 1990 Update. EPA/530-SW-90-042. June 1990." An example of how to use these national estimates is provided below for yard waste.

States must also determine what is allowed to be open burned. Depending on State and/or local laws, open burning may be

restricted to plant matter only or may be extended to general household MSW. Regardless of whether open burning is illegal or legal, a State must determine what relative proportions of the various types of plant matter and/or other MSW are being burned. If a State decides that open burning of yard waste or other municipal refuse does not occur because it is illegal, the State must be able to document that open burning is not practiced. If a State cannot determine that open burning is not occurring illegally, then it must determine how much is occurring. The various types of MSW that are open burned are addressed individually below.

Table 1

**Current and Projected Per Capita Generation of MSW
By Material, 1988 and 1995
(In pounds per person per day)**

Materials	1988	1995
Paper and Paperboard	1.60	1.80
Glass	0.28	0.23
Metals	0.34	0.34
Plastics	0.32	0.39
Rubber and Leather	0.10	0.10
Textiles	0.09	0.09
Wood	0.14	0.16
Other	0.07	0.06
Food Wastes	0.29	0.28
Yard Wastes	0.70	0.70
Misc. Inorganic Wastes	0.06	0.06
Total MSW Generated	4.00	4.21

Yard Wastes

Burning of leaves and other types of yard wastes occurs on residential, commercial/institutional, and industrial property. States must make reasonable estimates, based on knowledge of local yard waste management methods, of how many tons each of leaves, tree/brush clippings, and grass clippings are burned annually. In the case of leaves and grass trimmings, States must determine how many tons of leaves and grass are open burned. To calculate emissions for leaves, the State must determine which

kinds of leaves are burned, based on the tree populations in the State. Table 2.4-3 in the AP-42 document provides emission factors by tree type, including a factor for un-specified trees, in the case that tree type is not specified. For grass clippings, States may use the emission factor in Table 2.4-2 for "weeds-unspecified". In the case of miscellaneous tree/brush rubbish, States must first identify how many pounds of tree and brush rubbish are open burned. To calculate the emissions for this type yard waste, States may use the emission factor for "Forest Residues-unspecified" in Table 2.4-2 of the AP-42 document.

If a State is unable to determine how many tons of yard waste are burned each year, it may use the national per capita estimate from Table 1 for the generation of yard waste to develop this estimate. Knowing its population, a State may do the following calculation:

$$(0.70 \text{ pounds generated/person/day}) * (\text{number of people}) * (365 \text{ days/year}) = \text{pounds yard waste generated/year}$$

The State must then determine what fraction of the yard waste is open burned. The development of this fraction would be based on the State's best judgment of its local solid waste disposal practices. The State would then calculate the following:

$$(\text{fraction open-burned}) * (\text{pounds yard waste generated/year}) = \text{pounds yard waste open-burned/year}$$

Once a State has estimated the amount of waste open-burned per year, it must determine what fraction of this total estimate is leaves, tree/brush trimmings, and grass clippings. These fractions may then be multiplied by the total estimate of yard waste open-burned to get the amount of each type of waste burned. Using these numbers and the emission factors in Tables 2.4-2 and 2.4-3, a State may develop emission estimates for yard waste.

Household Waste

Burning of household MSW still occurs in some States. Burning of this type of waste may occur on residential, commercial/institutional, and industrial property. Based on information about local burning practices, States must estimate how many tons of household waste are open-burned per year. The national estimates provided in Table 1 of the various types of solid waste generated might be useful to States in generating

their estimate of household waste burned. To use the national data, a State would follow the example provided for yard waste. States may choose the types of waste from Table 1 to be included in their estimate of household waste open-burned, based on their knowledge of which types of waste are locally open-burned. Once a State has developed an estimate of the fraction of household waste open-burned, it may use the emission factors provided in Table 2.4-1 of the AP-42 document to estimate annual emissions from open burning of household waste.

Brush Clearing for Construction

Burning of brush, either in the form of a prescribed burning technique or a piling and burning technique, occurs in conjunction with the building of new homes, commercial/industrial buildings, and roads. Unless there is reason to do otherwise (e.g., if there is a program for chipping/mulching or some other practice), States may assume that this type of brush is disposed of only by the open burning method. States must determine what the average plot-size is for land cleared per house and industrial/commercial building constructed. States must also determine the average number of acres cleared per mile of road constructed. States must then determine how many structures and roads are constructed per year. Using these numbers, a State can calculate how many acres of brush are cleared and burned per year. Using the fuel loading factor for "Forest Residue-Unspecified" and the emission factors provided in Table 2.4-2 of the AP-42 document, States can estimate emissions per year for brush clearing.